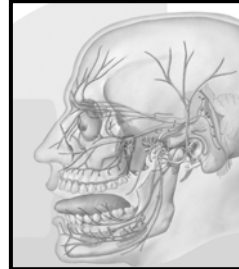


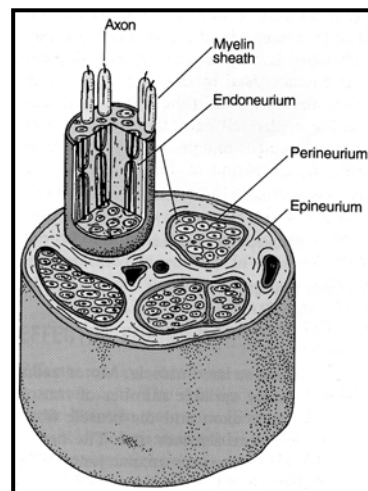
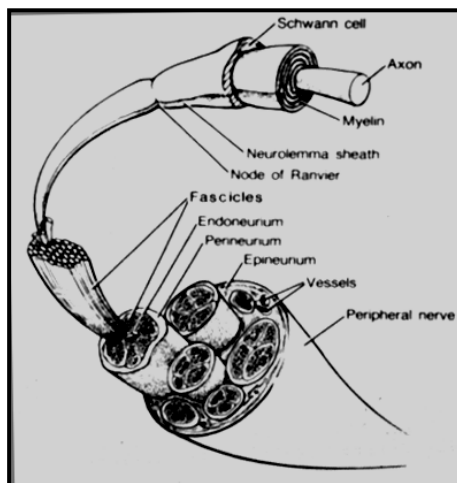
## Local Anesthesia and Dental Splinting

Brian Bast DMD, MD  
Associate Clinical  
Professor  
Department of Oral and  
Maxillofacial Surgery



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## Sensory Nerve



### **Fascicular Pattern of the Inferior Alveolar Nerve.**

Svane. J Oral Maxillofac Surg. 44:431, 1986

#### **Findings:**

Mean Nerve Diameter 4.7mm

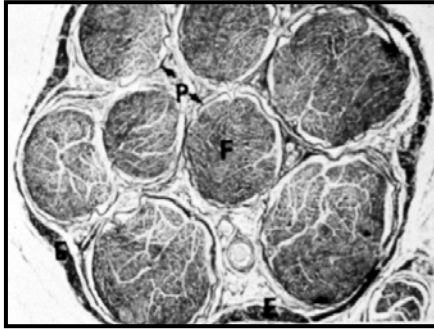
Mean Fascicle Diameter 1.4mm

Mean number of Fascicles Decreased  
from Proximal to Distal

Mental Foramen 12

1<sup>st</sup> Molar 18

3<sup>rd</sup> Molar 21



### **Fascicular Pattern of the Inferior Alveolar Nerve.**

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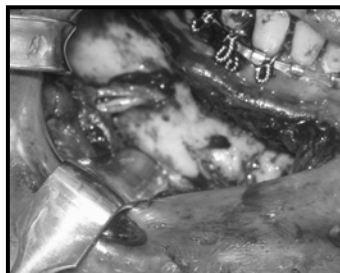
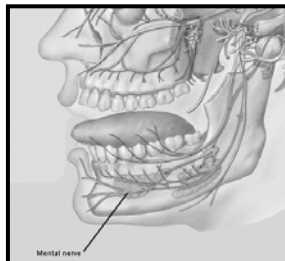
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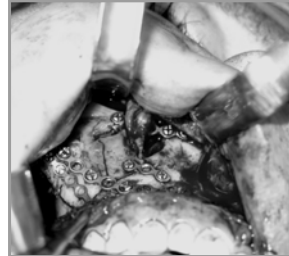
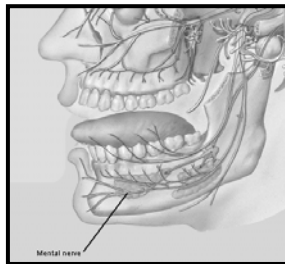
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Mental Foramen 12

1<sup>st</sup> Molar 18

3<sup>rd</sup> Molar 21



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### **Trigeminal Nerve**

#### **Sensory Nerves**

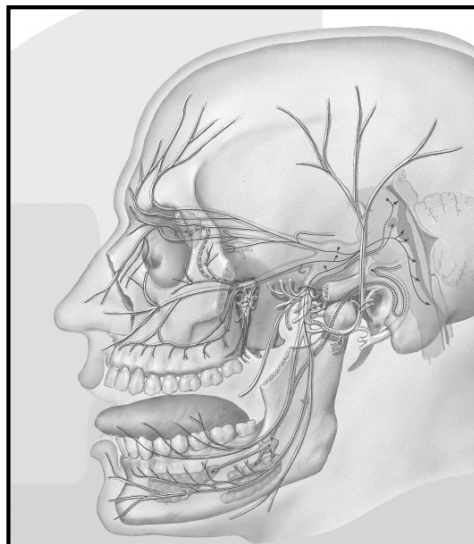
Touch

Pain

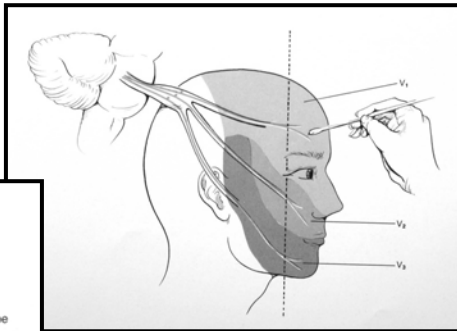
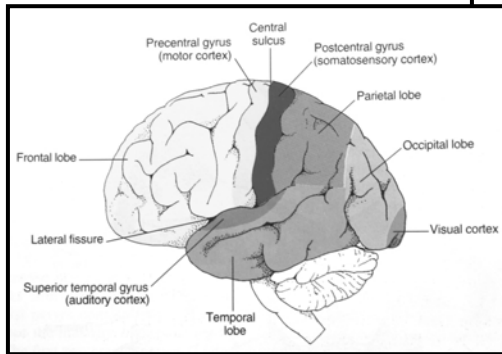
Temperature

Proprioception

(Direction)



## Somatosensory Cortex



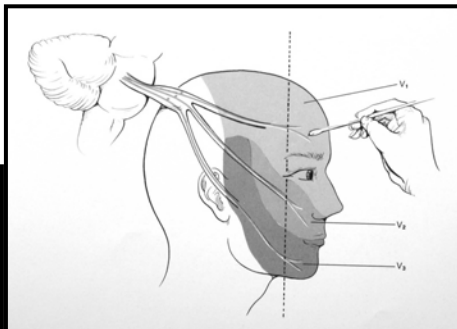
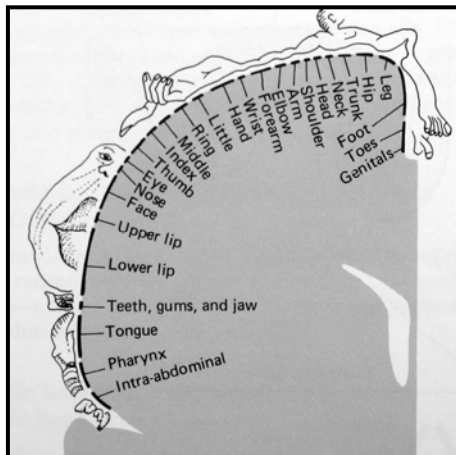
## Trigeminal Nerve

**V1 – Ophthalmic**

**V2 – Maxillary**

**V3 - Mandibular**

## Somatosensory Cortex

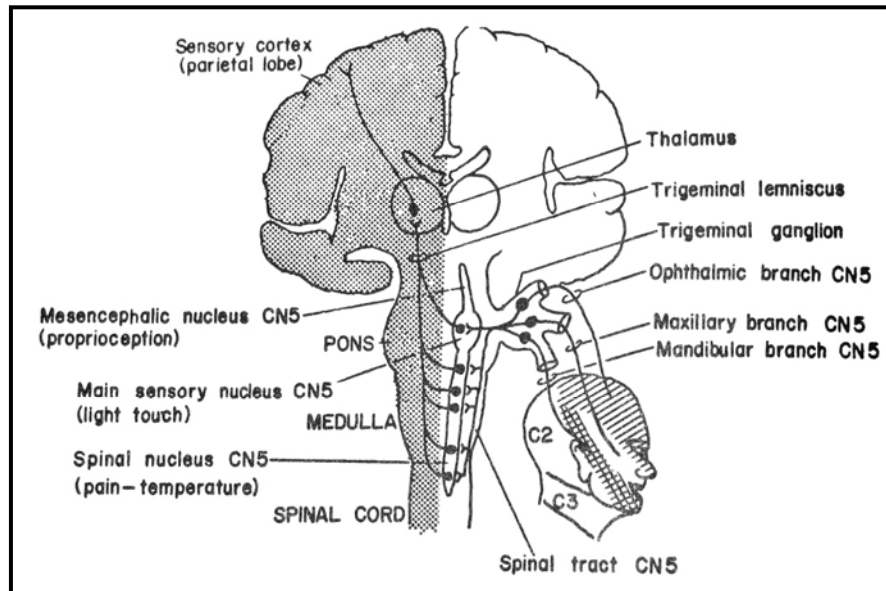


## Trigeminal Nerve

**V1 – Ophthalmic**

**V2 – Maxillary**

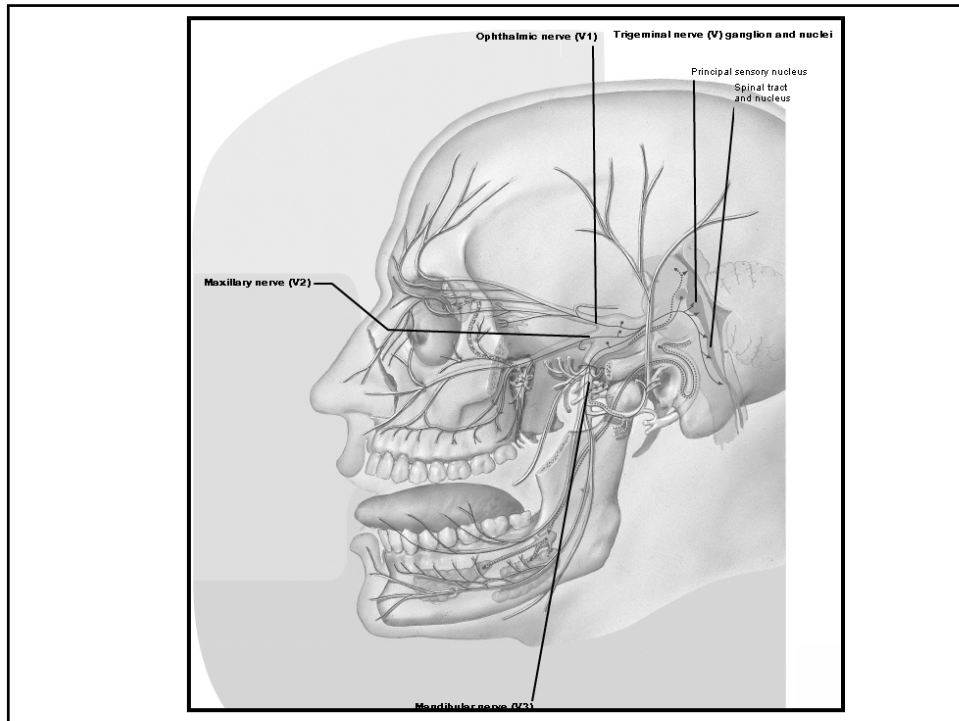
**V3 - Mandibular**



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*Zzzzzzzzz.....*





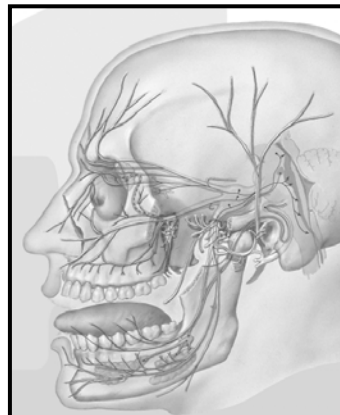
## Local Anesthetics: Classification

### Amides

Lidocaine  
Bupivacaine  
Mepivacaine  
others

### Esters

Procaine  
Tetracaine  
Benzocaine

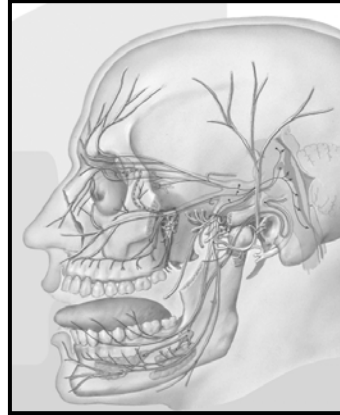


## Local Anesthetics: Properties

**pKa**

**Protein binding**

**Lipid solubility**



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## Local Anesthetics: pKa

The pH at which ionized and nonionized forms are equal.

Determines onset time of LA

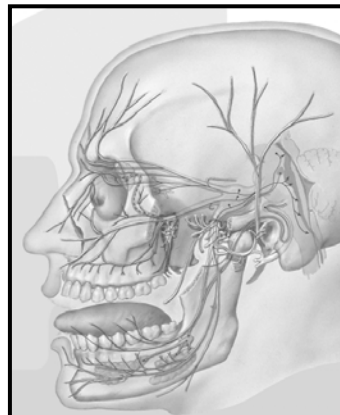
The closer to tissue pH the faster the onset time (tissue pH = 7.4)

pKa:

Lido 7.7 Marc 8.1

Lido onset 2-3 min

marc onset 7-9 minutes



## **Local Anesthetics: Protein Binding**

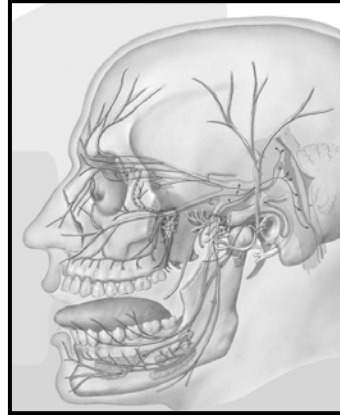
**Determines duration of action of LA.**

**More bound = longer acting**

**% bound:**

**Lido 65 (1-2 h)**

**Marc 95 (4-6h)**



## **Local Anesthetics: Lipid Solubility**

**Determines potency of LA.**

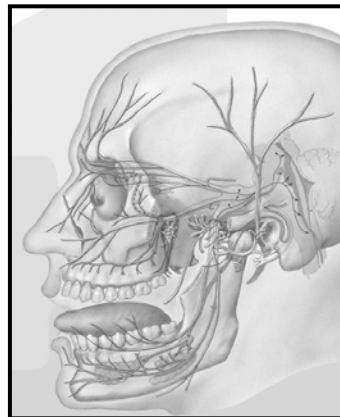
**More lipid soluble = more potent drug**

**Solubility:**

**Lido 4**

**Marc 28**

**Mepiv 1**





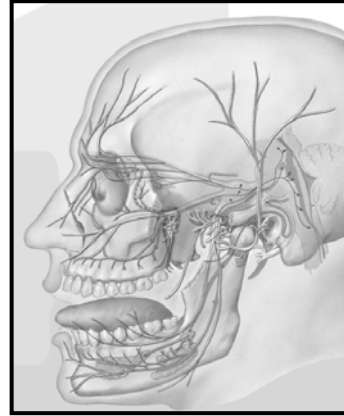
## **Anatomy of Local Anesthesia**

### **Clinical Considerations:**

**Type of Procedure – Pain control, Dental Procedure, Infection**

**Location – Maxilla, Mandible (dense bone)  
Buccal, Lingual**

**Always Consider the Surrounding Anatomy  
( blood vessels, nerves)**



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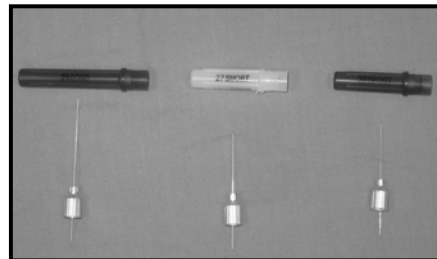
## **Anatomy of Local Anesthesia**

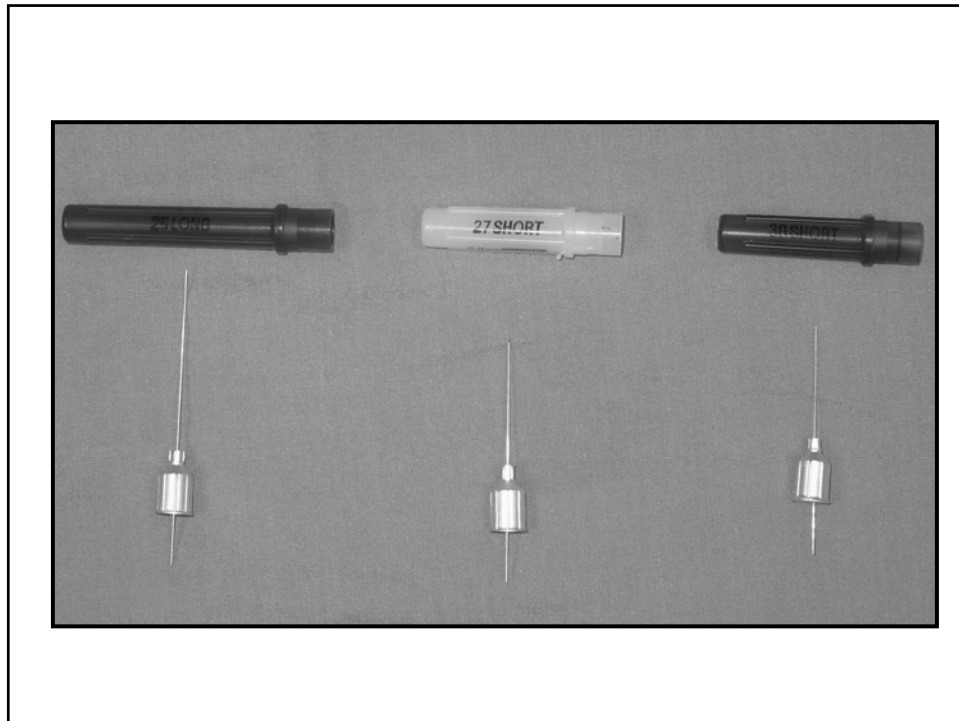
### **Clinical Considerations:**

**Diameter of Needle**

**Location – Maxilla, Mandible (dense bone)**

**Always Consider the Surrounding Anatomy  
( blood vessels, nerves)**





## Anatomy of Local Anesthesia

### Clinical Considerations:

Topical Anesthetic

Application – Dry Mucosal Surface

Prepare Patient



## Anatomy of Local Anesthesia

### Clinical Considerations:

Topical Anesthetic

Application – Dry Mucosal Surface

Prepare Patient



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## Clinical Considerations

### Maximum Dose

<u>Anesthetic</u>	<u>mg/ml</u>	<u>Max (mg/kg)</u>
2%Lidocaine	20	4.5
2%Lido w/ Epi 1:100,000		7
.5% Marcaine w/ 1:200,000 Epi	5	1.3

\*Typical Injection – 1-3 mL

## **Clinical Considerations**

### **Maximum Dose**

**Epinephrine** - .01 mg/mL (1:100,000)

**Healthy Adult** - .2mg (20 mL)

**Cardiovascular Disease** - .04 mg (4 mL)

**\*Typical Injection** – 1-3 mL

## **Anatomy of Local Anesthesia**

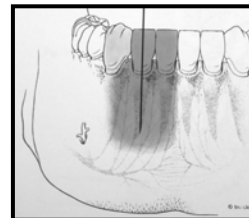
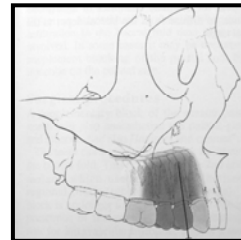
### **Clinical Terminology:**

#### **Local Infiltration**

**Deposition of anesthetic agent distally.**

**Relies upon diffusion through tissues to achieve anesthetic effect.**

#### **Block Anesthesia**



## Anatomy of Local Anesthesia

### Clinical Terminology:

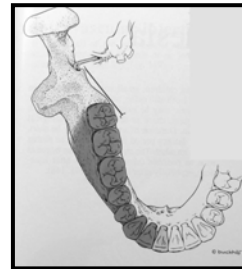
#### **Local Infiltration**

Deposition of anesthetic agent distally.  
Relies upon diffusion through tissues to achieve anesthetic effect.



#### **Block Anesthesia**

Deposition of anesthetic agent proximally. Provides anesthesia along the entire nerve distribution. Less dependent on diffusion through tissues.

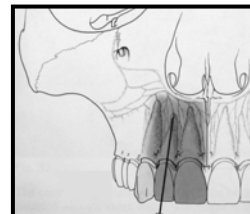


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## Infiltrations vrs Blocks

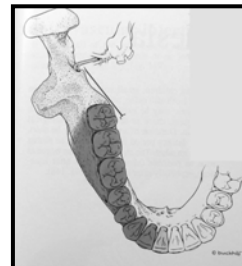
### Advantage of Infiltrations:

Simple  
Safe  
Good Hemostasis

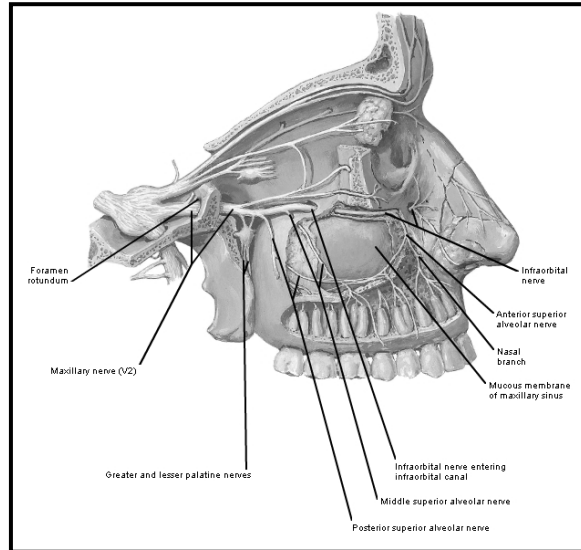


### Disadvantages of Infiltration

Shorter duration  
Multiple injections  
Inadequate anesthesia (site dependent)



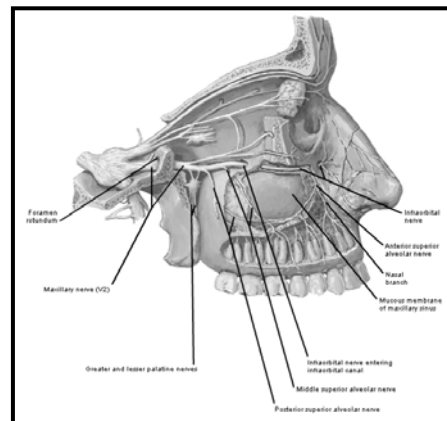
## Maxillary Anesthesia



## Maxillary Anesthesia

### Maxillary Blocks (buccal):

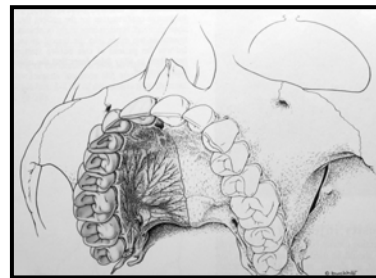
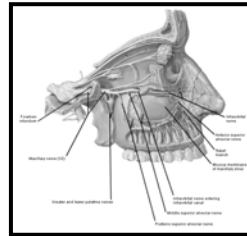
**Anterior Superior Alveolar**  
**InfraOrbital**  
**Middle Superior Alveolar**  
**Posterior Surperior Alveolar**



## Maxillary Anesthesia

### Maxillary Blocks (palatal):

Nasopalatine  
Greater Palatine  
Lesser Palatine



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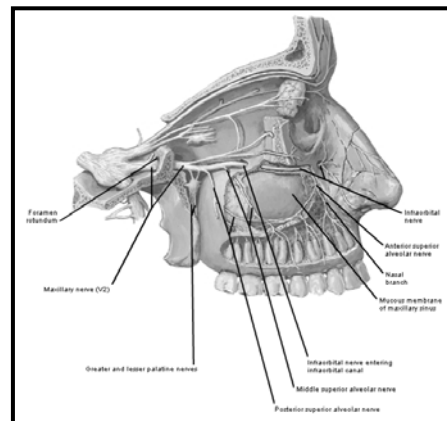
## Maxillary Anesthesia

### Clinical Considerations:

Infiltration effective

Less Dense Bone

May require buccal and  
palatal infiltration



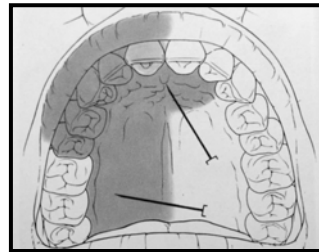
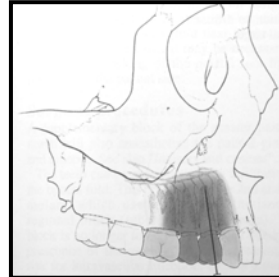
## Maxillary Anesthesia

### Clinical Considerations:

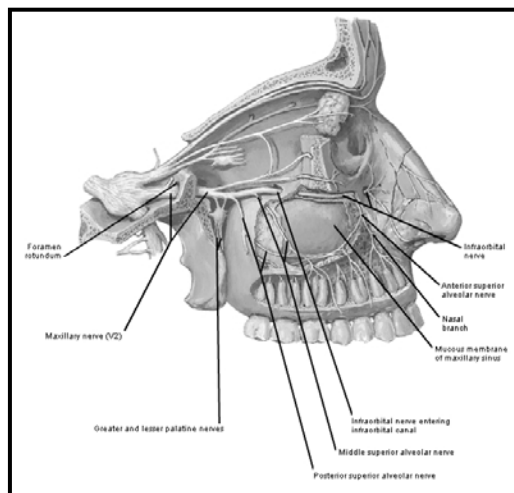
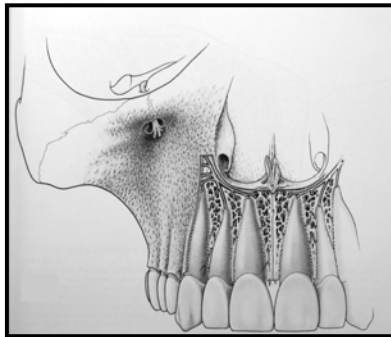
**Infiltration effective**

**Less Dense Bone**

**May require buccal and palatal infiltration**

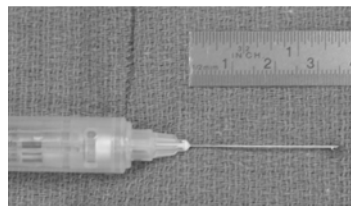
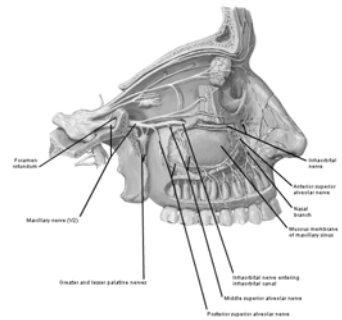
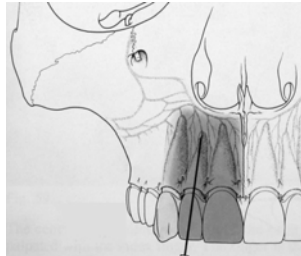


## Maxillary Anterior Region



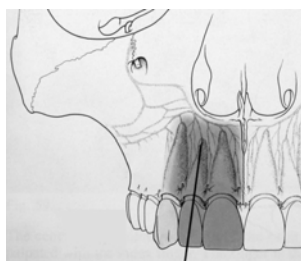


## Maxillary Anterior Region



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## Maxillary Anterior Region

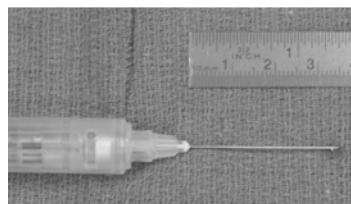


### Clinical Points

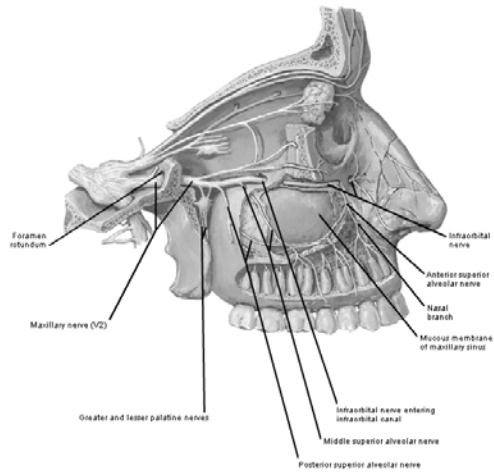
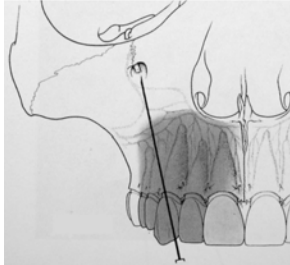
Depth of Injection 3-6mm

Primarily Buccal

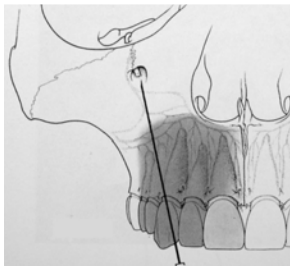
Anesthesia



## Maxillary Anterior Region



## Maxillary Anterior Region



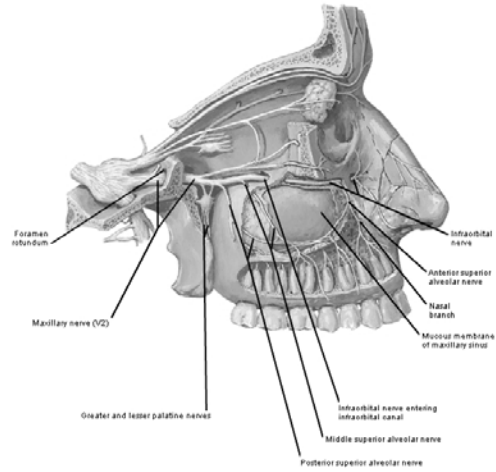
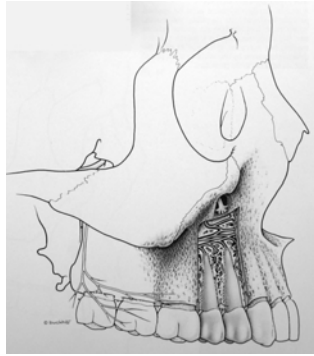
### Clinical Points

**Depth of Injection 10-15mm**

**Primarily Buccal**

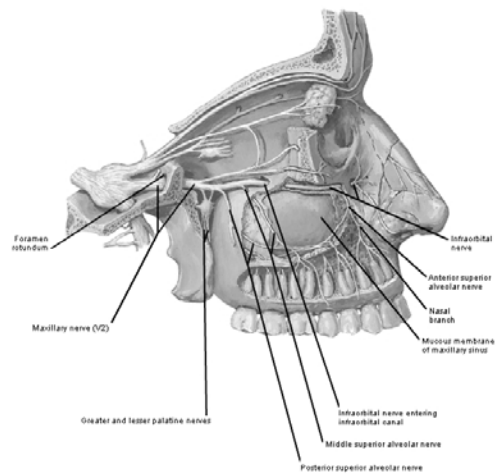
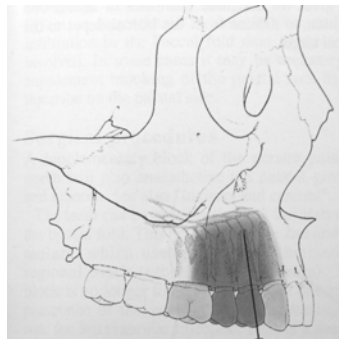
**Anesthesia**

## Maxillary PreMolar Region

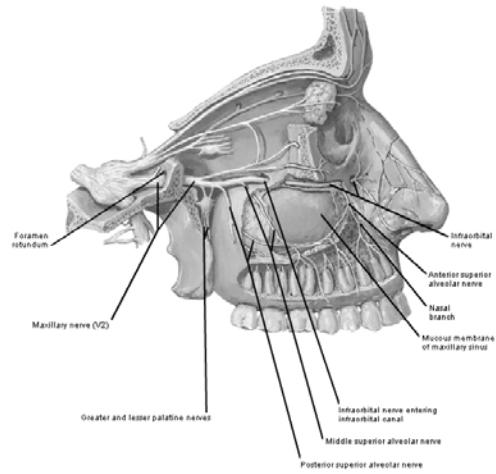
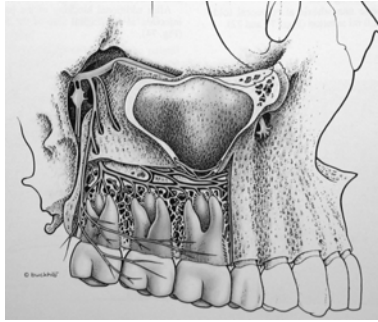


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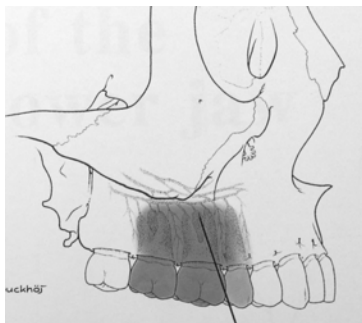
## Maxillary PreMolar Region



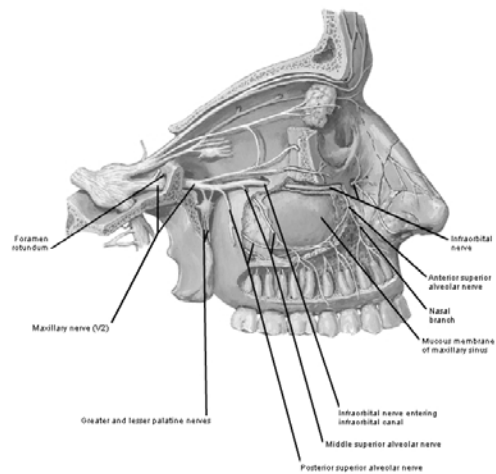
## Maxillary Molar Region



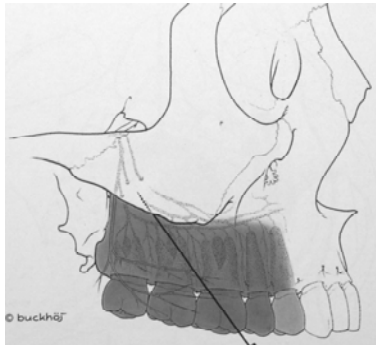
## Maxillary Molar Region



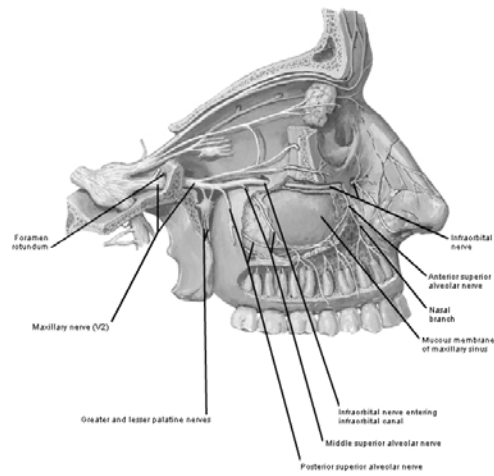
**Depth of Injection 6-10 mm**



## Maxillary Molar Region

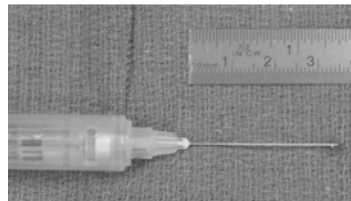
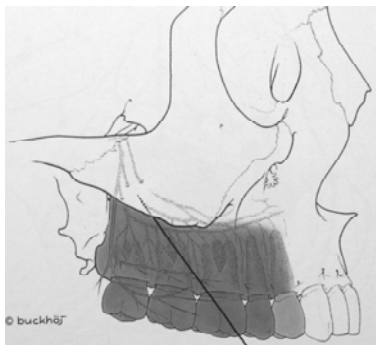


**Depth of Injection 15 -20 mm**

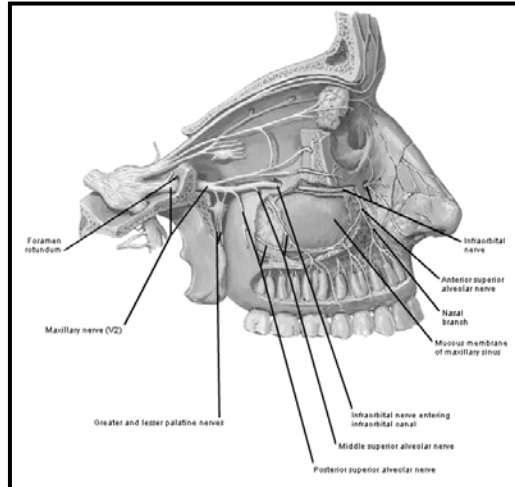
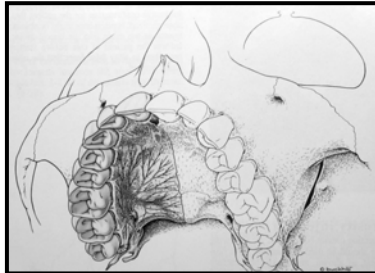


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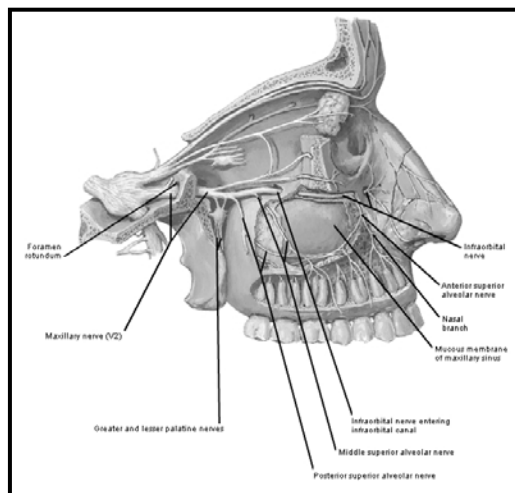
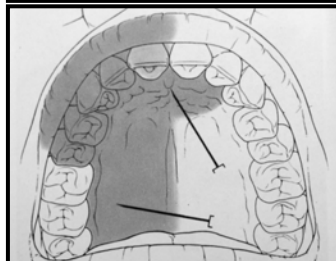
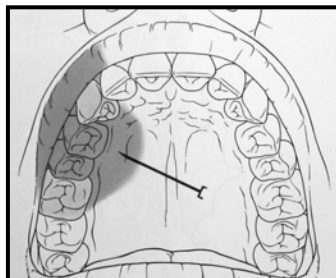
## Maxillary Molar Region



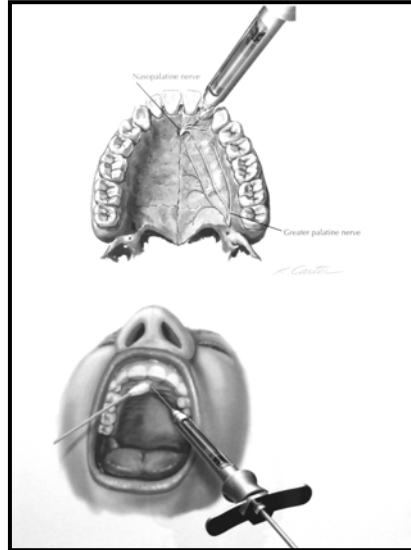
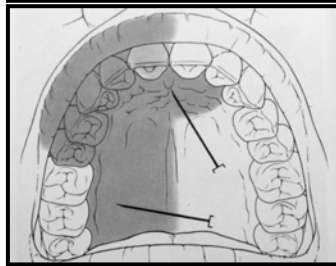
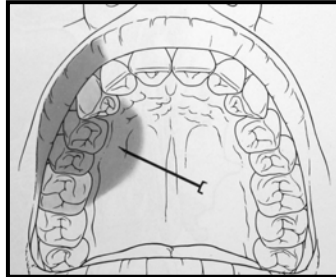
## Maxillary - Palatal Region



## Maxillary - Palatal Region

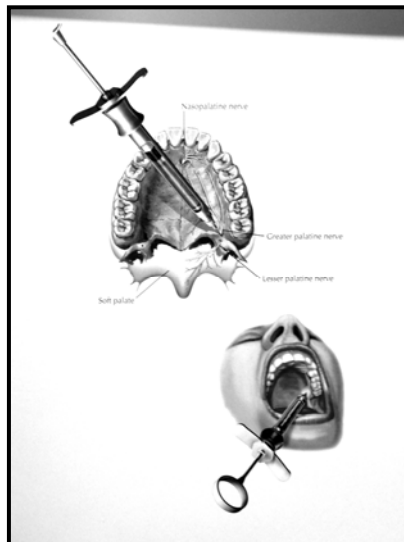
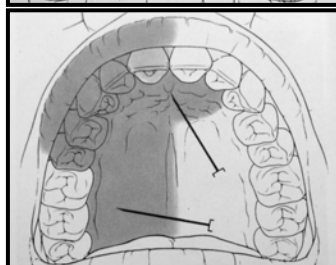
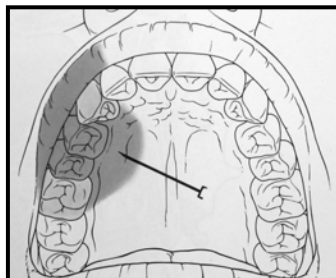


## Maxillary - Palatal Region

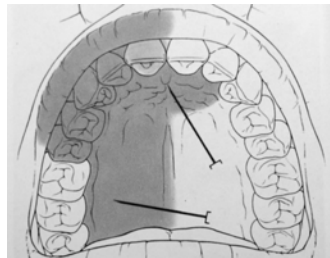
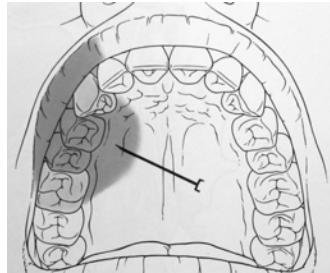


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## Maxillary - Palatal Region

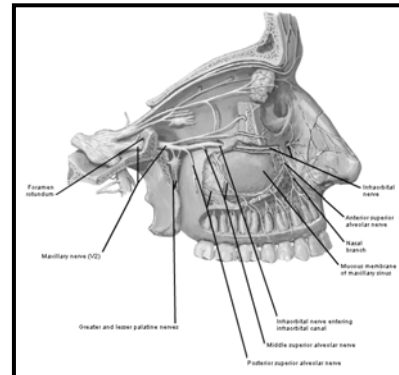


## Maxillary - Palatal Region



Depth of Injection 2-6mm

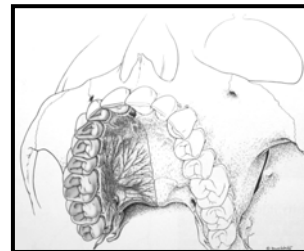
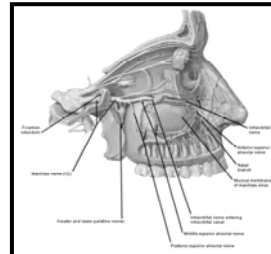
## Maxillary Anesthesia – Complete Maxillary Division (V2) Block





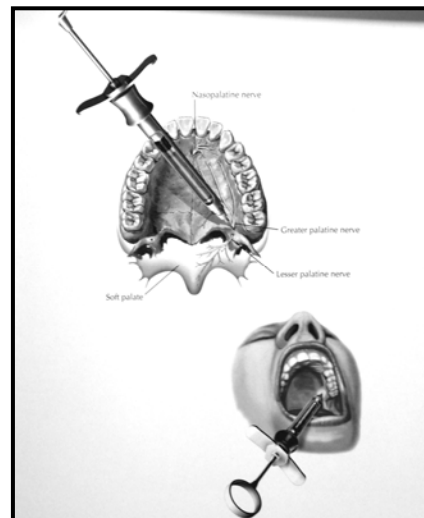
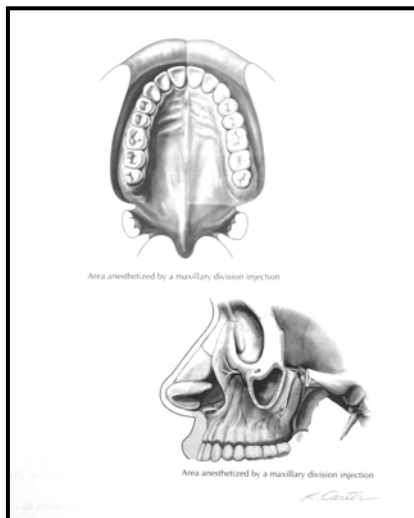
## Maxillary Anesthesia – Complete Maxillary Division (V2) Block

1. Greater palatine injection
2. Palpate the Greater Palatine Foramen
3. Probe for the Foramen
4. Passively insert needle into Canal (15 – 20mm)

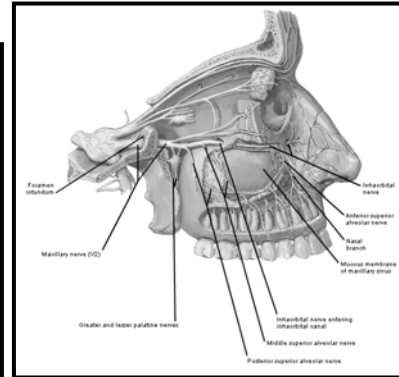
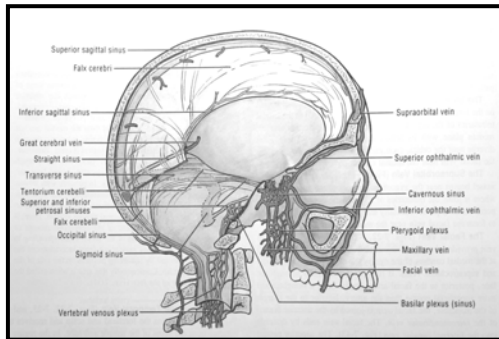


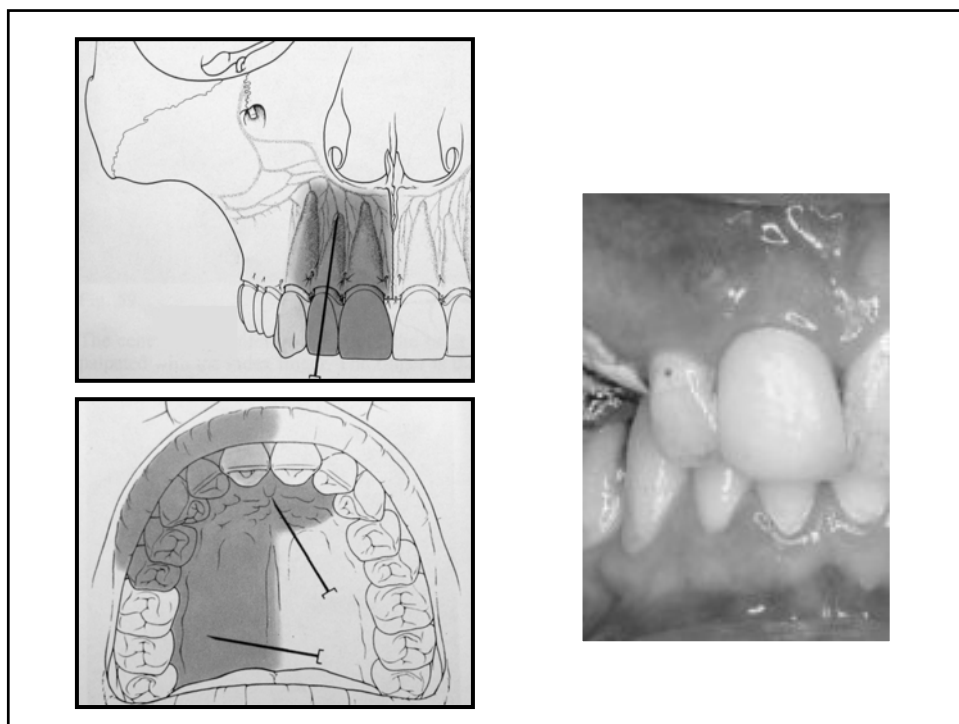
DropBooks

## Maxillary Anesthesia – Complete Maxillary Division (V2) Block

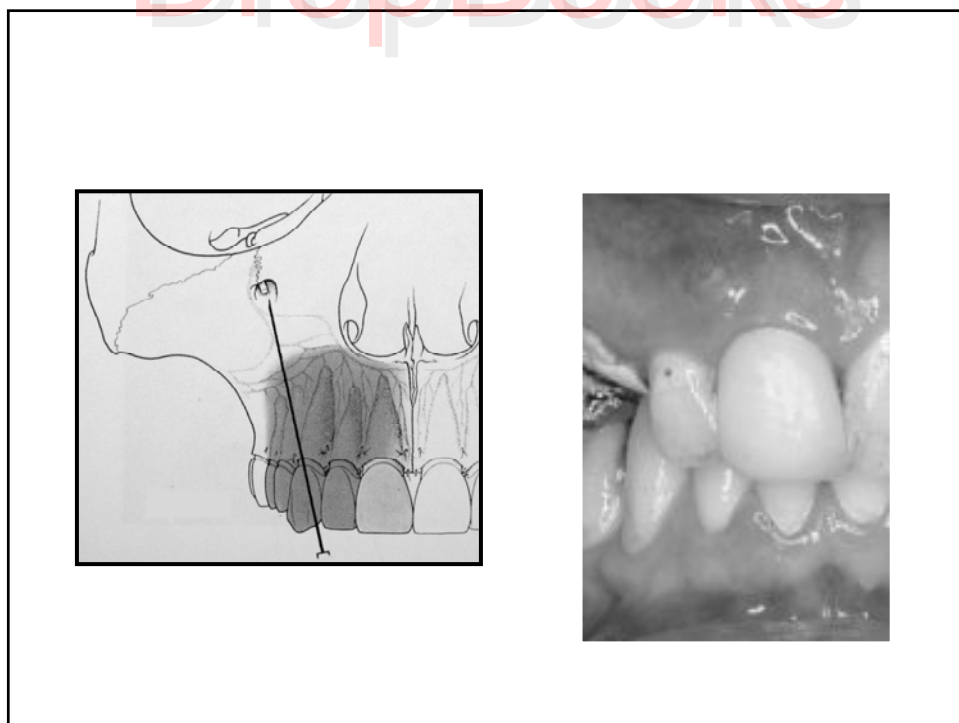


## Maxillary Anesthesia– Regional Precautions

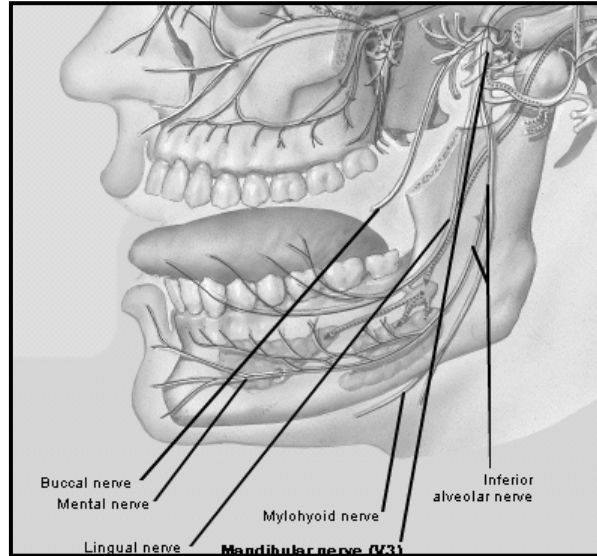




DropBooks



## **Mandibular Anesthesia**



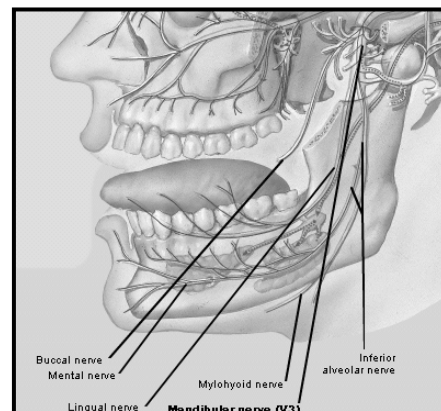
## **Mandibular Anesthesia**

### **Clinical Considerations:**

**Infiltration effective in Anterior Region.**

**Block Anesthesia often required in Posterior.**

**Dense Bone**



## Mandibular Anesthesia

### Mandibular Block Anesthesia:

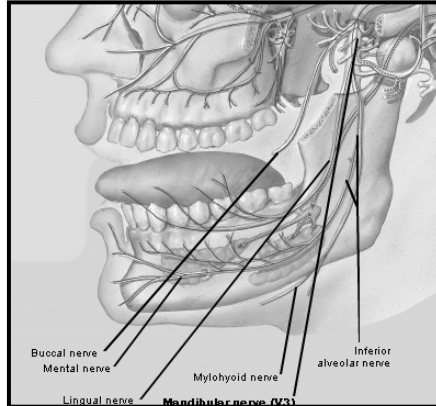
Inferior Alveolar

Lingual

Long Buccal

Mental

Mylohyoid



DropBooks

## Mandibular Anesthesia

### Mandibular Block Anesthesia:

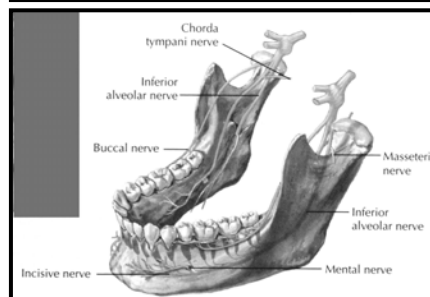
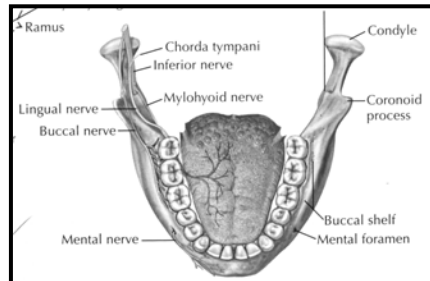
Inferior Alveolar

Lingual

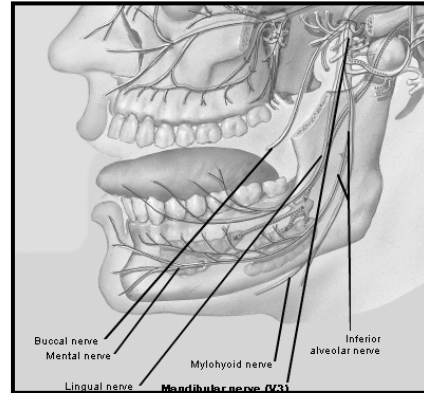
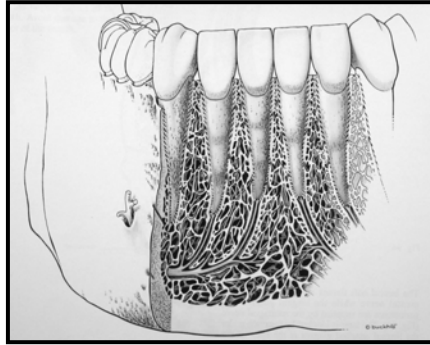
Long Buccal

Mental

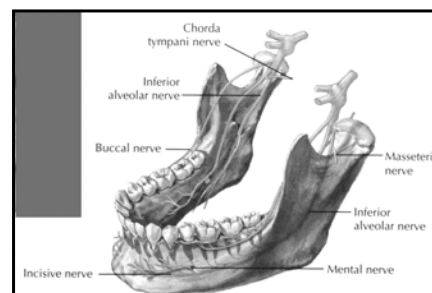
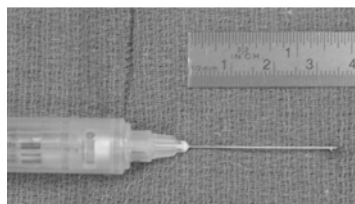
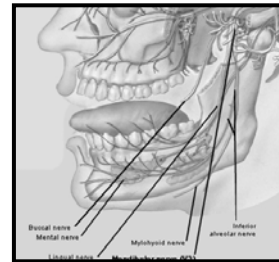
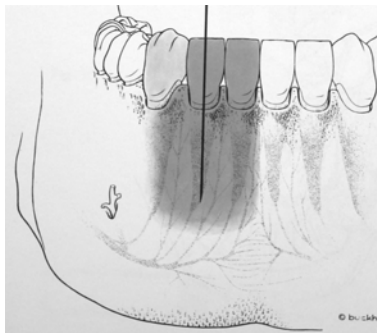
Mylohyoid



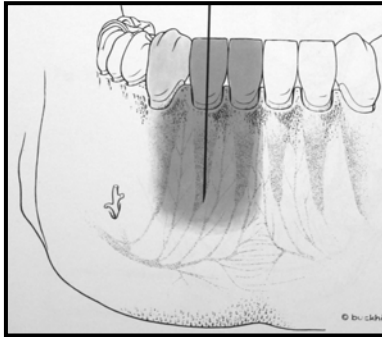
## Mandibular Anterior Region



## Mandibular Anterior Region

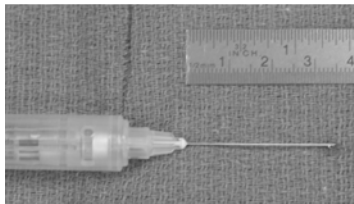


## Mandibular Anterior Region



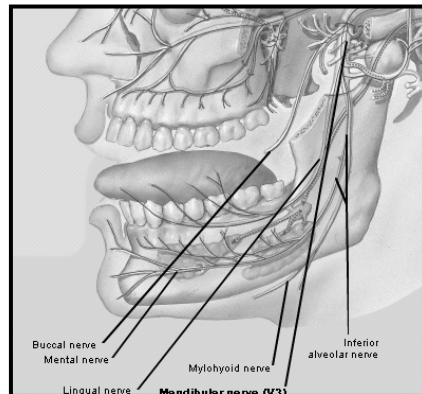
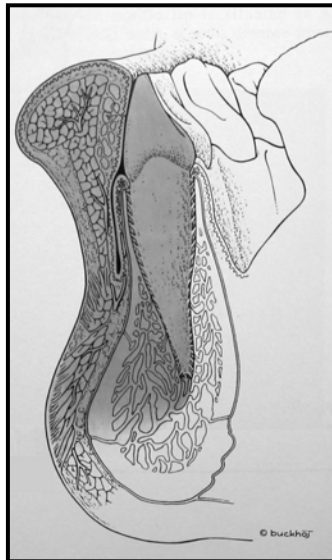
Depth of Injection 4-6mm

Primarily Buccal Anesthesia



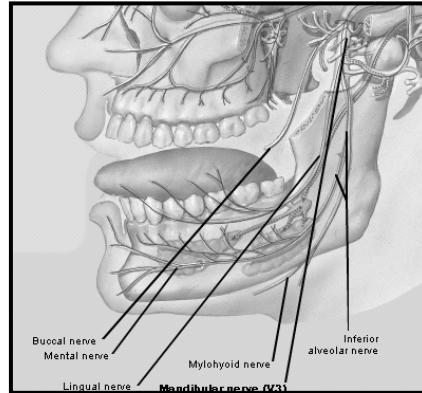
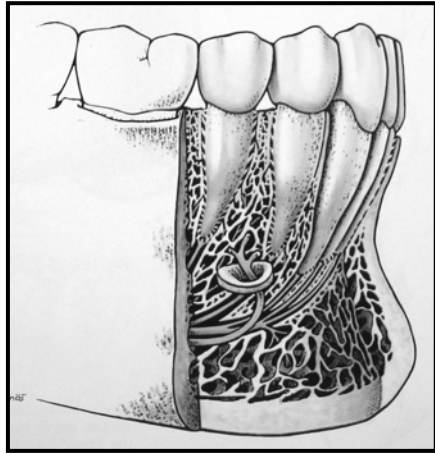
DropBooks

## Mandibular Anterior Region

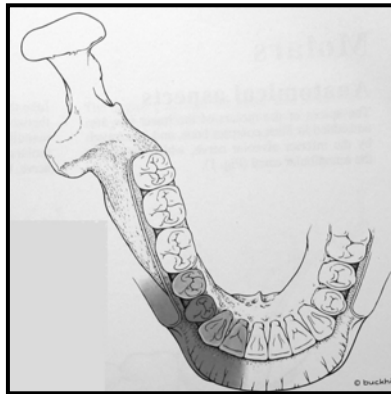


Buccal nerve  
Mental nerve  
Lingual nerve  
Mandibular nerve (V3)  
Mylohyoid nerve  
Inferior alveolar nerve

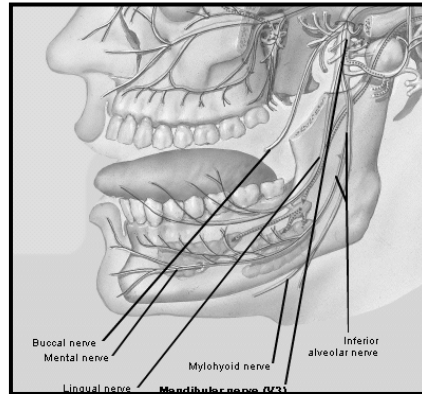
## Mandibular Premolar Region



## Mandibular Premolar Region

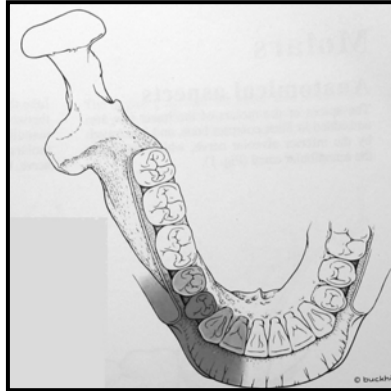


Mental Nerve Block





## Mandibular Premolar Region



Mental Nerve Block

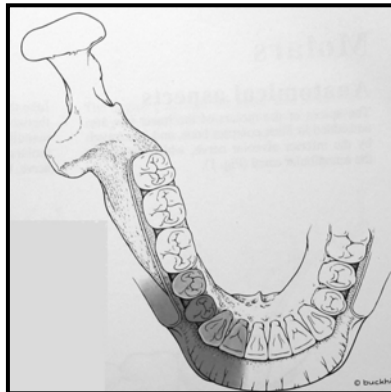


Depth of Injection 8-10 mm.

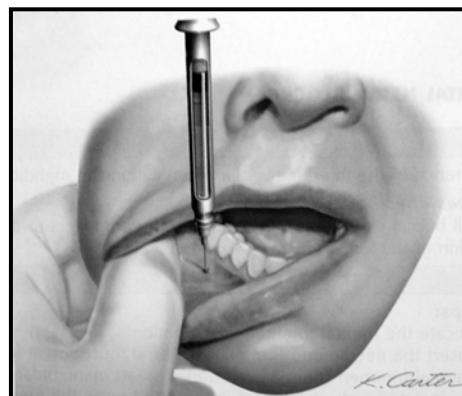
2<sup>nd</sup> PreMolar

DropBooks

## Mandibular Premolar Region



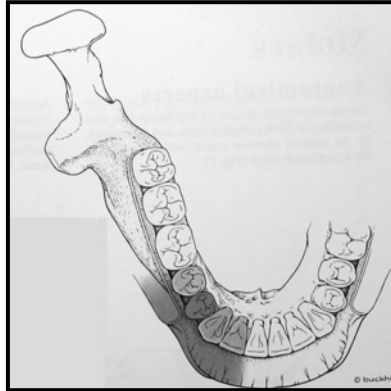
Mental Nerve Block



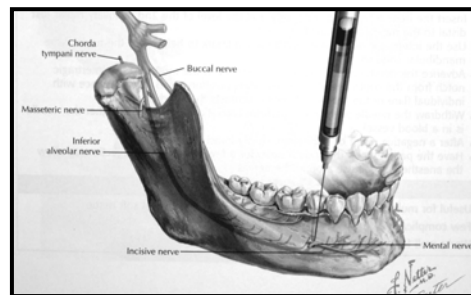
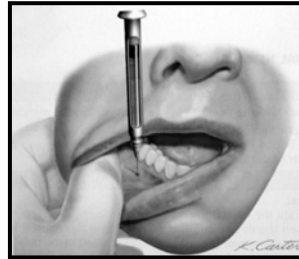
Depth of Injection 8-10 mm.

2<sup>nd</sup> PreMolar

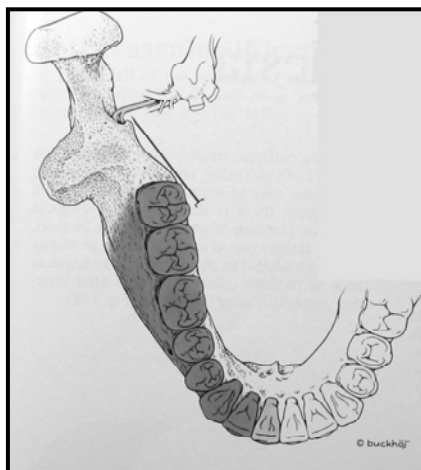
## Mandibular Premolar Region



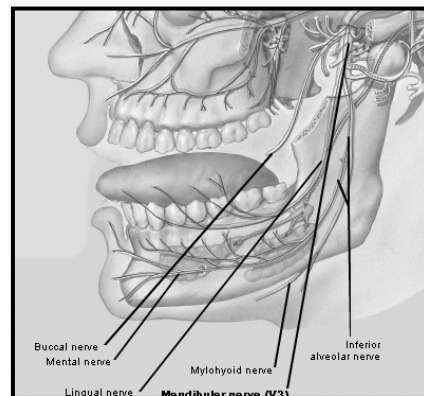
Mental Nerve Block



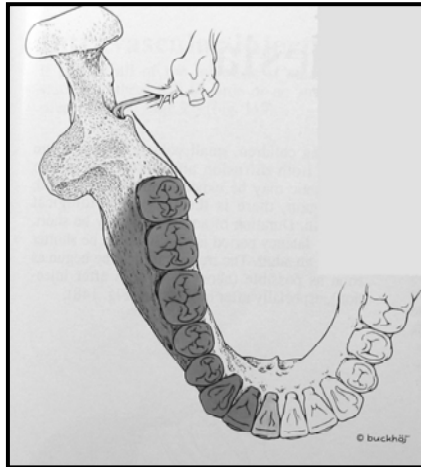
## Mandibular Premolar Region



Inferior Alveolar Nerve Block



## Mandibular Premolar Region



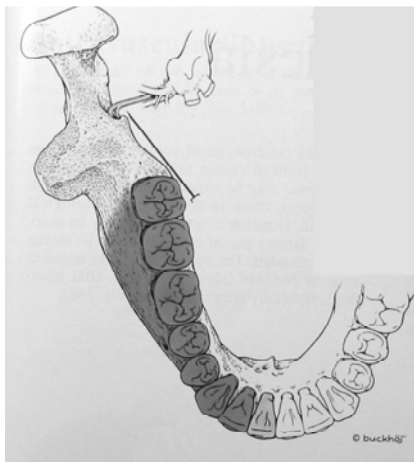
Mandibular Foramen below  
mandibular Occlusal Plane  
75%.

Depth of Injection 25 – 30mm

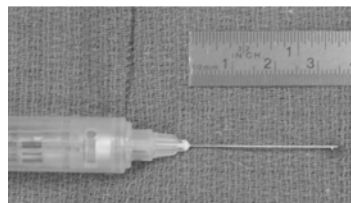
Inferior Alveolar Nerve Block

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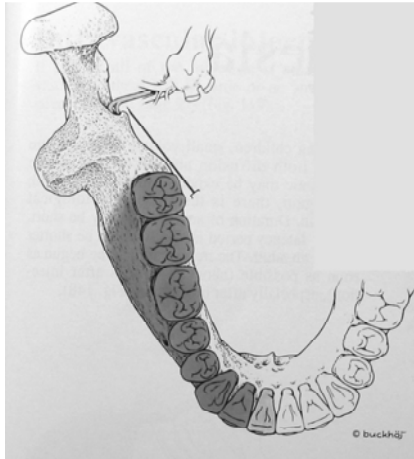
## Mandibular Premolar Region



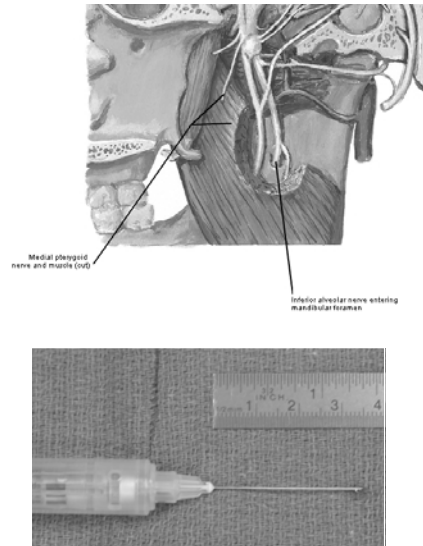
Inferior Alveolar Nerve Block



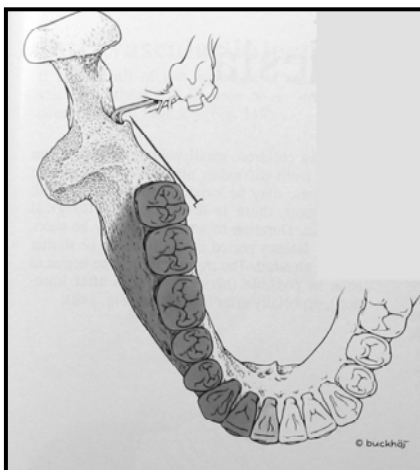
## Mandibular Premolar Region



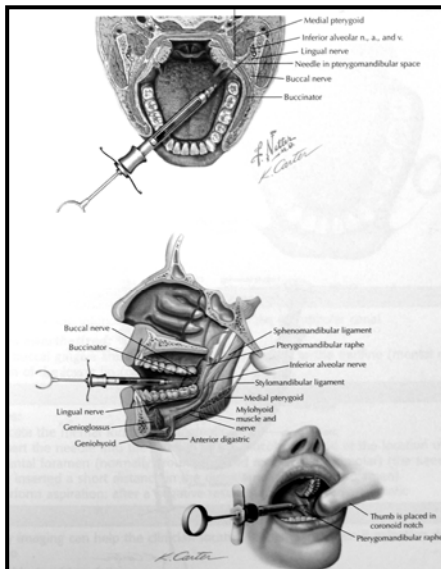
**Inferior Alveolar Nerve Block**



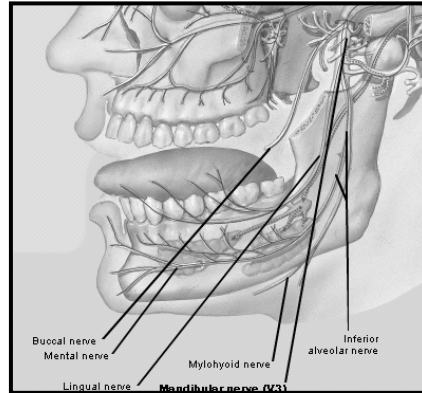
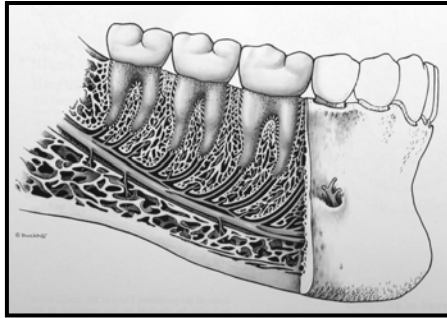
## Mandibular Premolar Region



**Inferior Alveolar Nerve Block**

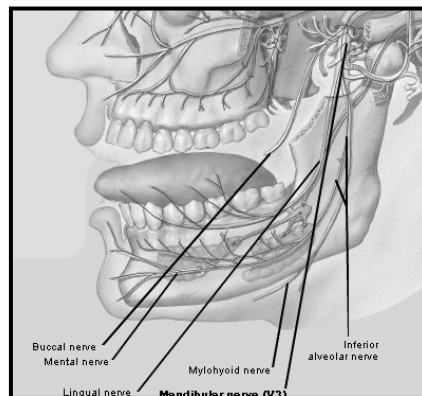
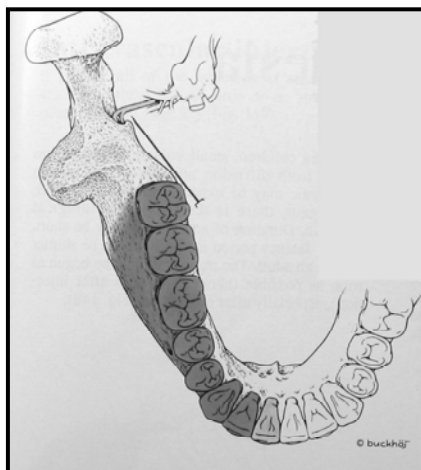


## Mandibular Molar Region



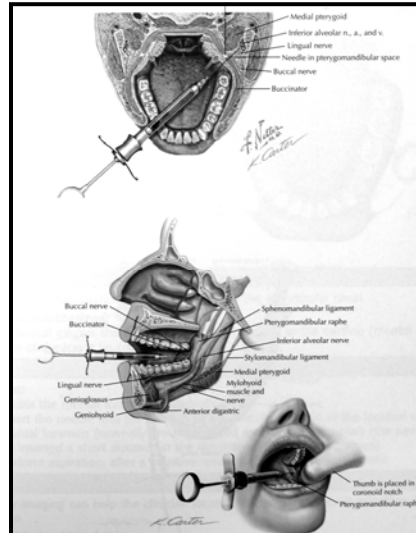
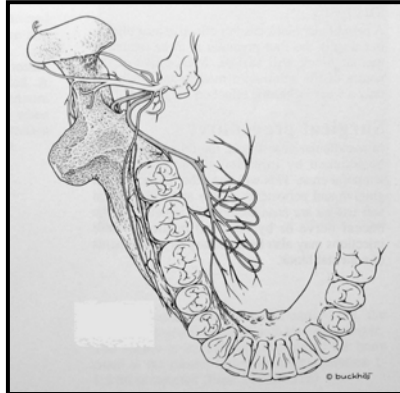
DropBooks

## Mandibular Molar Region

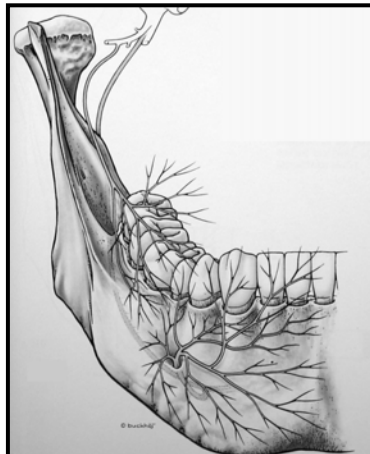


Inferior Alveolar Nerve Block

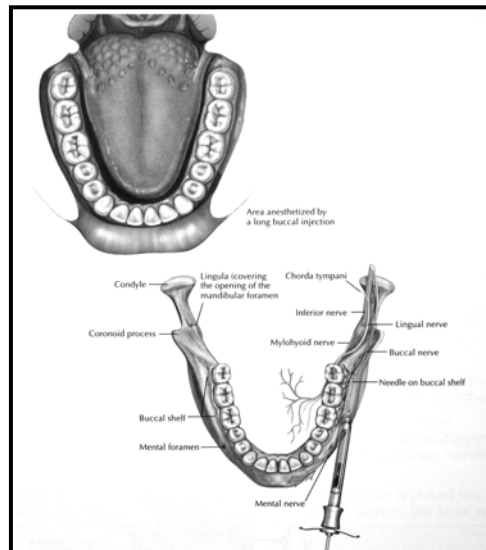
## Mandibular Molar Region



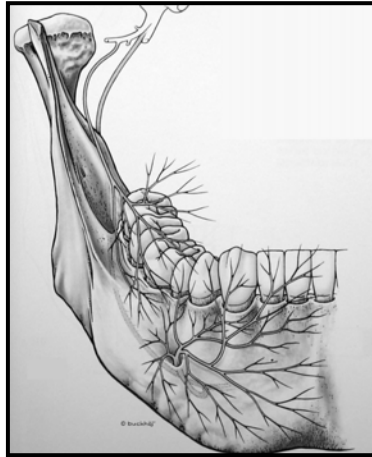
## Mandibular Molar Region



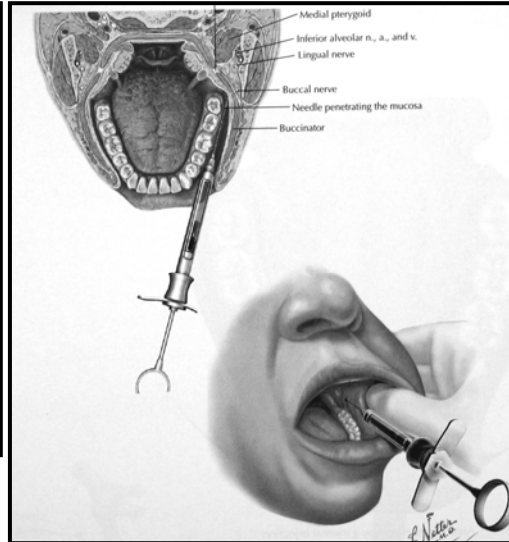
Buccal Nerve



## Mandibular Molar Region

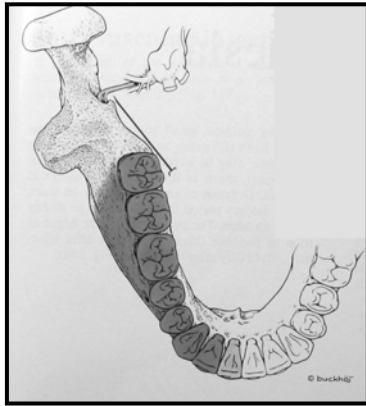
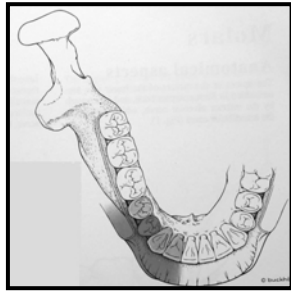
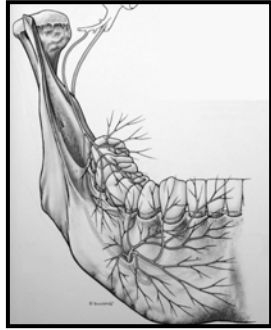


Buccal Nerve



DropBooks







### Mandibular Anesthesia – Regional Precautions



#### Trismus

1. Multiple Injections Through Muscles
2. Onset of symptoms early.
3. May take 10 -14 days to resolve.

DropBooks

### Mandibular Anesthesia – Regional Precautions



Nerve Injuries after Dental Injection:  
A Review of the Literature

Nerve injury caused by  
mandibular block analgesia

**NERVE DAMAGE ASSOCIATED**  
WITH INFERIOR ALVEOLAR NERVE BLOCKS  
M. ANTHONY POGREL, D.D.S., M.D., F.R.C.S.; JAMES BRYAN, B.S.;  
JOSEPH REGEZI, D.D.S.

### **Mandibular Anesthesia – Regional Precautions**



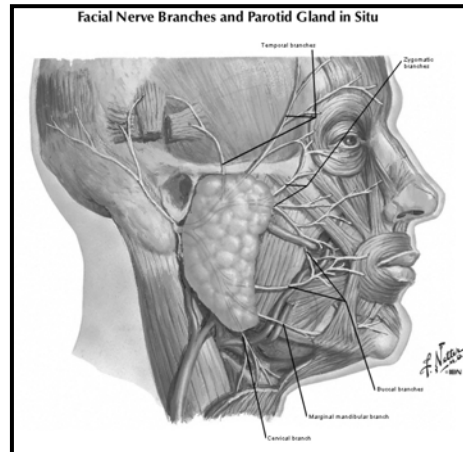
.15%-.54% Temp and .0001-.01% Perm

**Mechanisms** – Direct Trauma,  
Hematoma, Bleeding  
Neuro toxic

### **Mandibular Anesthesia – Regional Precautions**

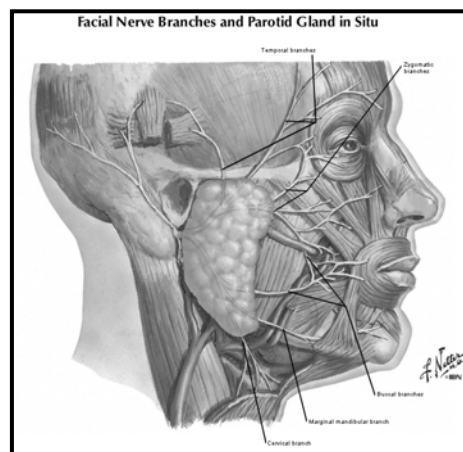
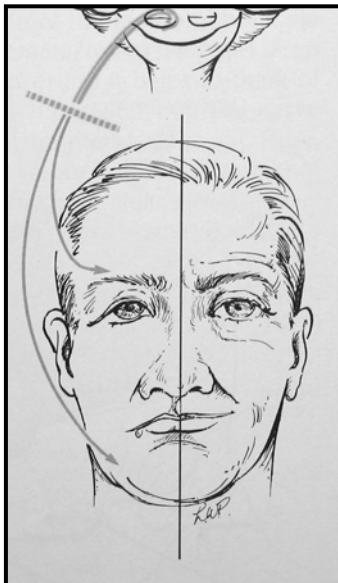


## Mandibular Anesthesia – Regional Precautions



DropBooks

## Mandibular Anesthesia – Regional Precautions



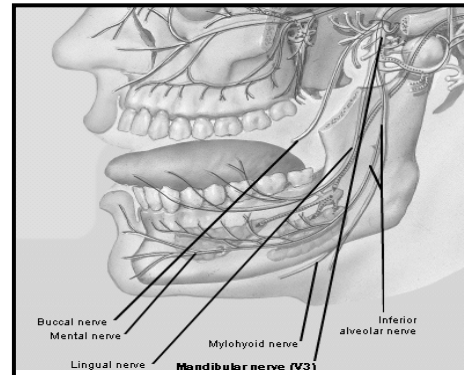
## **Mandibular Anesthesia – Missed Blocks/Inadequate Anesthesia**

1. Missed Block
2. High Mandibular Foramen



## **Mandibular Anesthesia – Missed Blocks/Inadequate Anesthesia**

1. Missed Block
2. High Mandibular Foramen
3. Accessory Innervation (mylohyoid nerve)



## Mandibular Anesthesia – Missed Blocks/Inadequate Anesthesia

1. Missed Block
2. High Mandibular Foramen
3. Accessory Innervation (mylohyoid nerve)
4. Bifid IA Nerve (4/5000 films)



## DropBooks

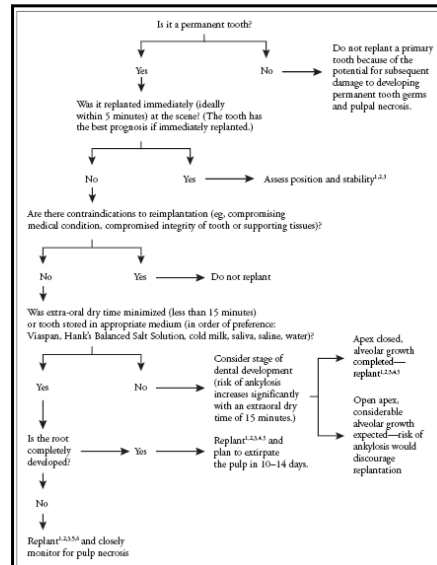
### Dental Splinting



## Dental Splinting

### Avulsion/Replantation

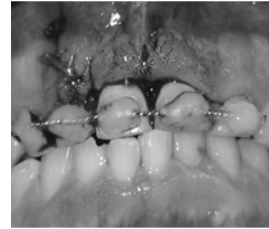
1. Irrigate Tooth
2. Local Anesthetic
3. Irrigate Socket
4. Replant Tooth
5. Splint
6. X-Ray



## Dental Splinting



## Dental Splinting

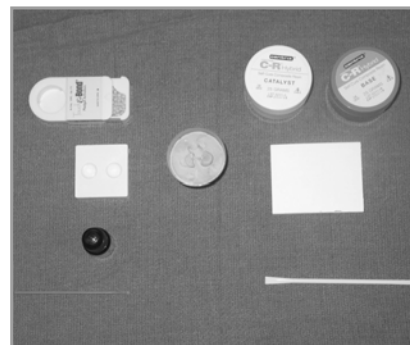


DropBooks

## Dental Splinting

### **Avulsion/Replantation**

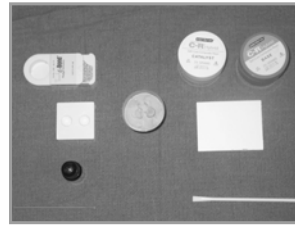
- 1. Activate Bonding Agent**
- 2. Apply Bonding Agent to Teeth.**
- 3. Wait 20 sec.**
- 4. Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
- 5. Composite on tooth, apply wire and wait.**



## Dental Splinting

### **Avulsion/Replantation**

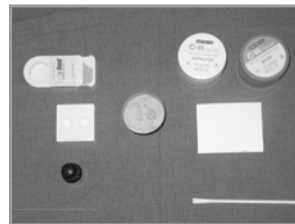
1. **Activate Bonding Agent**
2. **Apply Bonding Agent to Teeth.**
3. **Wait 20 sec.**
4. **Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
5. **Composite on tooth, apply wire and wait.**



## Dental Splinting

### **Avulsion/Replantation**

1. **Activate Bonding Agent**
2. **Apply Bonding Agent to Teeth.**
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4. **Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
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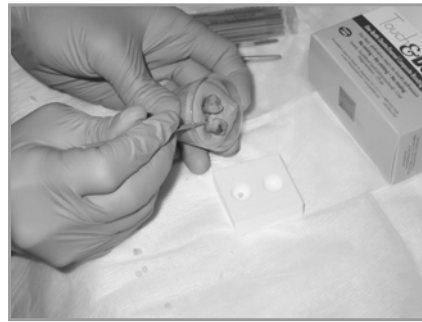
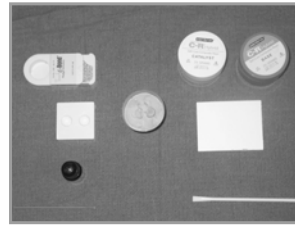




### Dental Splinting

#### **Avulsion/Replantation**

1. **Activate Bonding Agent**
2. **Apply Bonding Agent to Teeth.**
3. **Wait 20 sec.**
4. **Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
5. **Composite on tooth, apply wire and wait.**



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### Dental Splinting

#### **Avulsion/Replantation**

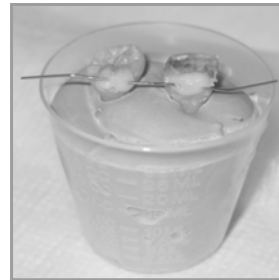
1. **Activate Bonding Agent**
2. **Apply Bonding Agent to Teeth.**
3. **Wait 20 sec.**
4. **Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
5. **Composite on tooth, apply wire and wait.**



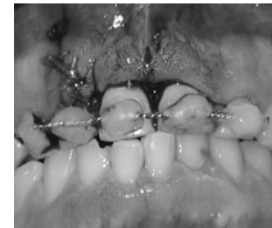
## Dental Splinting

### **Avulsion/Replantation**

1. **Activate Bonding Agent**
2. **Apply Bonding Agent to Teeth.**
3. **Wait 20 sec.**
4. **Place equal Amounts of Base and Catalyst on Mixing pad and mix.**
5. **Composite on tooth, apply wire and wait.**



## Dental Splinting



**That's All Folks!!!!**



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